



2018 APS/CNM USERS MEETING

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Advanced Photon Source

Use of the Advanced Photon Source, an Office of Science User Facility operated for the U.S. Department of Energy (DOE) Office of Science by Argonne National Laboratory, was supported by the U.S. DOE under Contract No. DE-AC02-06CH11357.

Chemistry

A1	Cecilia Gentle	Internal Atomic-scale Structure, Band Alignment, and Charge Transfer Dynamics of ZnTe/CdSe Core/Shell Quantum Dots
A2	Katherine Harmon	Mapping the Electrochemical Double Layer at the Graphene-water Interface with Resonant Anomalous X-ray Reflectivity
A3	Scott C. Jensen	X-ray Spectroscopy of Iron-based Catalysts for Oxygen Reduction
A4	Lu Ma	High-capacity Sodium Peroxide Based Na–O ₂ Batteries with Low Charge Overpotential via a Nanostructured Catalytic Cathode
A5	Jonnathan Medina-Ramos	Understanding the Structural Dynamics of Bismuth-based Cathodes in Solutions of Alkyl-imidazolium Ionic Liquids, under Conditions for Electrochemical CO ₂ Reduction
A6	Eric Sylvester	Diarylmaleimide-based Crystalline Solids
A7	Ming-Feng Tu	Focused MHz Pink Beam for X-ray Emission Spectroscopy
A8	Qi Wang	Probing Adsorption Interactions in High Valence Metal-organic Frameworks by <i>in situ</i> Single Crystal X-ray Diffraction

Condensed Matter Physics

A9	Athby Al-Tawhid	Structural Comparison of the Metallic and Insulating Interface at the LaCrO ₃ /SrTiO ₃ Heterojunction
A10	Ivan Kuzmenko	GISAXS Studies of Self-assembled Gold Nanoparticles at the Liquid-vapor Interface
A11	Zhu Liang	A Nanoscale View of Assisted Ion Transport across the Liquid-liquid Interface
A12	Ph. Materne	Suppression of the Magnetic Order in CeFeAsO: Non-equivalence of Chemical and Hydrostatic Pressure
A13	Shua Sanchez	X-ray Diffraction to Probe Orthorhombic Domain Detwinning and Elastoresistance on Single Crystal Ba(Fe _{0.975} Co _{0.025}) ₂ As ₂ under <i>in situ</i> Tunable Uniaxial Stress

Environmental Science and Geology

A14 Christian Mundorf Anthropogenic Aerosol Microparticulates Measured Middle East

High Pressure

A15 Wenli Bi Studies of Magnetism in Dysprosium under Extreme Pressures

A16 Yi Hu An Integrated Portable Online Sample Observation, Ruby Fluorescence and X-ray Absorption Measurement System

A17 Eran Greenberg X-ray Emission Spectroscopy at High-pressure, High-temperature Conditions

A18 Yuming Xiao 16-ID-D: High Pressure Spectroscopy Beamline at HPCAT

A19 Dongzhou Zhang Recent Developments at the Partnership for Extreme Xtallography Program

Instrumentation

A20 Sergey P. Antipov Fabrication and Performance of Diamond Refractive Lenses for Hard X-ray Applications

A21 Vivek G. Badami Real-time *in situ* Metrology of an X-ray Adaptive Mirror Using an Array of Interferometric Absolute Position Sensors

A22 V. De Andrade Full-field *in situ* Nano-tomography Activity at the Advanced Photon Source

A23 B.C. Chan Development of Fast-framing Hybridized X-ray Imaging Detector for "single shot" Experiments

A24 Nicholas Holtgrewe Advanced High-resolution Integrated Optical System

A25 Sheng Lee Radio-frequency Scanning Tunneling Microscope (RF-STM): A Strong Resistant to External Current's Interference to the Conventional Tunneling Current

A26 S.D. Marks *In situ* Hard X-ray Characterization for Growth of Complex Metal Oxide Thin Films

A27 Tim Mooney SoftGlueZynq: Custom Electronics for Beamlines

A28 Liam O'Ryan Xspress 3 Mini Digital Pulse Processor

A29 Orlando Quaranta Hard X-ray Transition-edge Sensor Spectrometer for the Advanced Photon Source

A30	Deming Shu	Design and Development Progress at the Nanopositioning Support Lab for APS Operations and Upgrade Project
A31	Chengjun Sun	Development of a Miniature X-ray Emission Spectrometer (miniXES) for Simultaneous Multi-color Emission Studies of the Non-resonant X-ray Emission Spectroscopy (XES) and Sequential Resonant XES for Multiple Edges/Elements
A32	I.B. Vasserman	Senis Hall Probe Speed Dependence Issues
A33	Junqi Xie	Progress Towards Ultrafast Detectors for GHz Hard X-ray Imaging

Materials Science

A34	S. Aryal	Cation Mixing in Li-rich Mn-Ni-Fe Oxide Cathodes and Its Impact on Voltage Fade
A35	Michael Behr	Evolution of Carbon Fiber Microstructure during High-temperature Graphitization Measured <i>in situ</i> Using Synchrotron Wide-angle X-ray Diffraction
A36	Jiyu Cai	Advanced Characterization of Crystallinity-controllable Growth of Nanostructured Zinc Oxide via Atomic Layer Deposition
A37	Yujia Ding	<i>In situ</i> EXAFS-derived Mechanism of Highly Reversible Tin Phosphide/Graphite Composite Anode for Li-ion Batteries
A38	Jeffrey A. Fortner	Synchrotron X-ray Microanalysis of Uranium Materials for Nuclear Forensics
A39	Matthew G. Frith	An <i>in situ</i> Synchrotron X-ray Scattering Study of Microstructural Evolution in a Ni-based Alloy
A40	Ryan C. Hurley	Studying Granular Micromechanics with Grain-resolved X-ray Computed Tomography and 3D X-ray Diffraction
A41	Jan Ilavsky	Extended Range Ultra Small-angle X-ray, Small-angle, and Wide-angle Scattering for Materials Characterization at 9ID Beamline
A42	Qian Li	Development of a Time-resolved Multimodal Imaging Platform
A43	Yanqi Luo	Understanding How the Halide Distribution Affects Charge Collection within Halide Perovskites Solar Cells Using <i>in situ</i> X-ray Nanoprobe Microscopy
A44	Ryan McCall	Resilient High Temperature UHV Sealing
A45	Xiao Wang	Direct Observation of Coherent and Anti-aligned Skyrmions in Co and Gd Layers in [Co/Gd/Pt] _n Multilayers Using X-PEEM

A46	Tianpin Wu	<i>In situ</i> Investigations of Catalysis and Batteries Using a Quick Scanning Monochromator at Beamline 9-BM
A47	Chen Zhang	Analyzing the Accuracy Limits of Lattice Strain Extracted from Laue Microdiffraction Patterns Using Virtual Diffraction
A48	Hua Zhou	Investigating Atomic Structures of Mesoscale and Highly Curved Two-dimensional Crystals by Surface X-ray Nanodiffraction

Nanoscience and Nanotechnology

A49	Kamil Kucuk	Structure and Electrochemistry of Doped $\text{Li}_2\text{FeSiO}_4/\text{C}$ Material as a Cathode for Li-ion Batteries
A50	Srikanth Nayak	Inter-polymer Complex Mediated Assembly of Gold Nanoparticles

Other

A51	Clayton Bennett	Acoustic Levitation in X-ray Scattering Experiments
A52	Alex Deyhim	Beamline Front Ends for CHESS-U
A53	Alex Deyhim	Latest Development in X-ray Shielding Lead Encapsulated Enclosures
A54	Anton J. Frommelt	LRL-CAT: An Automated X-ray Crystallography Synchrotron Beamline for Structure-based Drug Design
A55	Shengmin Luo	Quantitative Texture Analysis of Wet Clays during Thixotropic Hardening Using Synchrotron X-ray Diffraction
A56	Jonathan Baldwin	Update from the APS/XSD Detectors Group Activities
A57	Jing Peng	Quantitative Texture Analysis of Wet Clays during Thixotropic Hardening Using Synchrotron X-ray Diffraction
A58	Syed Sajid Ali	Zone Plate Performance as a Function of Tilt Analyzed via Multislice Simulations
A59	Everett Vacek	Correlative Cryo Confocal Light Microscopy (C^3LM) and X-ray Fluorescence
A60	Randall E. Winans	SAS2018 – International Meeting on Small Angle Scattering

Polymers

A61	Ryan Poling-Skutvik	Polymer-induced Structural Changes in Suspensions of Gold Nanorods
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Technique

A62	Andre Al Haddad	Characterizing Photoinduced Excited States with ~ 10 ps Resolution Using Time Slicing X-ray Absorption Spectroscopy
A63	Ming Du	3D Object Reconstruction beyond the Depth-of-focus Limit Using Automatic Differentiation
A64	Y. Zou Finrock	Confocal X-ray Fluorescence Microscopy at the Advanced Photon Source Sector 20
A65	Aura Inés González	High Photon Flux XUV Source Driven by High Repetition Rate >100 kHz Fiber Laser
A66	Niranjan D. Parab	Multi-scale Imaging in Metal Additive Manufacturing
A67	Lynn Ribaud	Synchrotron Powder Diffraction Simplified: The High-resolution Diffractometer 11-BM at the Advanced Photon Source
A68	M.L. Rivers	areaDetector: What's New?

Center for Nanoscale Materials

Use of the Center for Nanoscale Materials was supported by the U.S. Department of Energy, Office of Science, Office of Basic Energy Sciences, under Contract No. DE-AC02-06CH11357.

Chemistry

C1	A. Jean-Luc Ayitou	Triplet-triplet Annihilation-based Photon Upconversion Using All-organic Polycyclic Aromatic Donor and Acceptor Chromophores
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Instrumentation

C2	C.L. Chang	CNM and CMB Science
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Materials Science

C3	Arun Mannodi-Kanakkithodi	Composition Engineering of Lead-based Hybrid Perovskites for Intermediate Band Photovoltaics
C4	J. Ding	Design, Fabrication and Performance of the Transition-edge Sensor Array for SPT-3G Experiment

C5	Jue Gong	Retarded Oxidation Kinetics in Perovskite Methylammonium Tin(II) Iodide via Organic Antioxidants
C6	Sergi Lendinez	Temperature Dependent Magnetotransport Properties of a Single Nanodisk
C7	Kendra Letchworth-Weaver	Modeling Electrolyte Influence on Stability and Interfacial Structure of Functionalized LiMn_2O_4 Battery Cathodes
C8	Liang Li	Understanding Oxygen Redox Activity in Li-rich Cathode Materials: An Experimental and Theoretical Core-level Spectroscopic Study
C9	Beihai Ma	Characterization of Carbon Nanostructures in Copper Covetics by STEM and HIM
C10	Zachary R. Mansley	Atomic Scale Surface Studies of Perovskite Oxide Nanoparticles
C11	V. Novosad	Low-loss Dielectric Films for CMB-S4 Detector Arrays
C12	A. Pateras	Dynamical Scattering Effects in Coherent X-ray Nanodiffraction
C13	Tomas Polakovic	Ion Beam Assisted Sputtering of NbN for Quantum Sensing Applications
C14	Eric Schwenker	Computer Vision and Atomic Reconstruction at Solar Cell Interfaces
C15	Yi Xia	Renormalized Lattice Dynamics Properties from High-order Phonon-phonon Interactions
C16	V. Yefremenko	Superconducting Thin Films for CMB-S4 Transition Edge Sensors
C17	Adina Luican-Mayer	Negative Differential Resistance in Charge Density Wave Phase of 1T-TaS_2
C18	Zhizhi Zhang	Spin Waves in Patterned Yttrium Iron Garnet Nanostructures

Nanoscience and Nanotechnology

C19	Dheyaa Alameri	Controlled Selective CVD Growth of ZnO Nanostructures Enabled by Mask-Free Fabrication Approach Using Aqueous Fe Catalytic Ink
C20	Alexandra Brumberg	Material Dimensionality Effects on Electron Transfer Rates between CsPbBr_3 and CdSe Nanoparticles
C21	Thomas Cecil	Fabrication Needs and Progress for CMB-S4
C22	Peijun Guo	Slow Thermal Equilibration in Hybrid Organic-inorganic Perovskites Revealed by Transient Mid-infrared Spectroscopy

C23	Qianran He	Design and Synthesis of Si@void@C Micro-reactors for Next-generation High-power, High-capacity Li-ion Batteries
C24	Spencer T. Hills	FANTASTX: An Automated Experimental-computation Approach to Determining Nanoscale Structures
C25	Olga V. Makarova	Gold Electroplating of High-aspect-ratio Submicron Structures
C26	C. Suzanne Miller	Fabrication Capabilities Utilizing a Stepper
C27	N. Moldovan	Zone Plates for Hard X-ray Focusing with 5 nm Finest Zones and Beyond
C28	Igor Paprotny	Enhancing Selectivity of Chemiresistive MWCNT/MOX VOC Sensors through Morphology Optimization
C29	Chen Wang	High Open-circuit Voltage Graphene/Silicon Solar Cell with h-BN as a Tunneling Layer
C30	Ratul Majumdar	Behavior-differentiated Control of Swarms of Field-programmable Stress-engineered MEMS Microrobots
C31	Natechanok Yutthasakunthorn	Stabilizing Phosphorene <i>via</i> Hexagonal Boron Nitride Passivation
C32	Rui Zhang	Manipulating the Charge State of Individual Defects in WSe ₂

Exemplary Student Research Program

Using the world-class facilities at Argonne's Advanced Photon Source, area high school students and their teachers explore the principles and operation of these tools and conduct research during the school year. Under the guidance of staff scientists, each team develops an achievable project based on the techniques and limitations within a specific research group, prepares and submits a research proposal, sets up the experiment, gathers and analyzes their results, draws conclusions, and prepares a final poster for the Users Meeting.

ESRP1	Aqsa School	How Modern Batteries Work: The Effect of Particle Size on Battery Performance
ESRP2	Downers Grove South High School	Connection between Chlorosis in Illinois Birch Trees and Bioavailability of Iron in Adjacent Soil
ESRP3	Glenbard East High School	The Characterization of Metal Concentration and Distribution in Lichens with Varying Tolerance to Air Pollution
ESRP4	Glenbard South High School	X-ray Study of the Chemical Composition of the Digestive Tracts of Wastewater Microbes
ESRP5	Glenbrook South High School	Fingerprinting Chemistry and Magnetism at the Nanoscale Using SX-STM

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ESRP6	Hoffman Estates High School	Characterizing the Structure of Self-assembled Lead (II) Sulfide Nanoparticle Superlattices Based on Variable Ligand Surface Coverage
ESRP7	Lemont High School	Continued Observations from X-ray Elemental Analysis of Ash Tree Species Related to the Growth of Emerald Ash Borer Populations
ESRP8	Lincoln-Way East High School	Uncovering Flaws and Failures in Catalytic Converters Using XANES
ESRP9	Lockport Township High School	Calibration of Beamline 17-ID Using Bovine Insulin
ESRP10	Maine East High School	X-ray Study of the Behavior of a Commercial Ferrofluid
ESRP11	Naperville Central High School	Investigating Transition Metals with SX-STM: Data Storage in the 21st Century Studied by a Synchrotron STM
ESRP12	Neuqua Valley High School	Study of Manganese in Soils Collected from Chicago Residential Areas
ESRP13	Romeoville High School	Atomic-scale Imaging of Phenylalanine Self-assembly on a Copper Surface
ESRP14	Schurz High School	Soil Mineral Composition and Its Effect on Crop Species
ESRP15	Tinley Park High School	An Examination of Heavy Metal Concentration in Primary and Permanent Molars from Pre-industrial Societies